

IN THE CLAIMS:

1. (currently amended) A method of inserting a watermark composed of a plurality of binary information in an image comprising at least three components, the method comprising the steps of:

- decomposing (E201) at least one component of the image into detail sub-bands in various directions and comprising coefficients, each coefficient being characterized by its position in the detail sub-band to which it belongs and its amplitude,
- determining (E204), for each position, information representing local amplitude variations in various directions from amplitudes of the coefficients at the position in the various detail sub-bands and coefficients close to the position in the various detail sub-bands,
- determining (E402), a watermarking strength at each position from information representing local amplitude variations in various directions determined for the position,
- forming (E305), for each position and for each component, a vector whose coordinates are the amplitudes of the coefficients at the position in the various detail sub-bands of the component,
- selecting (E309), for each position, one vector amongst the vectors formed for the position,
- watermarking (E310) the image by modifying, for each position, the amplitude of the coefficients which are the coordinates of the vector selected for the position according to the binary information corresponding to the position and according to the watermarking strength determined for the position.

2. (original) The method as claimed in claim 1, wherein each component of the image is decomposed into detail sub-bands in various directions, the information representing amplitude variations are determined for each component and, for each position, the watermarking strength is determined at each position of each component.

3. (currently amended) The method as claimed in claim 2, wherein the step of determining information representing local amplitude variations for each component and for each position ~~is decomposed into sub~~ further comprises the steps of:

- squaring (~~E203~~) the amplitude of each coefficient of each detail sub-band of each component,

- calculating (~~E204~~) a median value from the squared amplitudes of the coefficient and the coefficients close to the coefficient, for each coefficient of each detail sub-band of each component.

4. (currently amended) The method as claimed in claim 3, wherein the determination of the watermarking strength at each position of each component is ~~decomposed into sub~~ further comprises the steps of:

- forming a vector whose coordinates are median values calculated in each detail sub-band,

- grouping together vectors whose coordinates are similar in predetermined classes, and

- allocating a watermarking strength to each position according to the predetermined class to which the vector of the position belongs.

5. (original) The method as claimed in claim 4, wherein the predetermined classes are the class containing the vectors representing zones not comprising any variations and/or the class containing the vectors representing zones of the image comprising mainly horizontal variations, and/or the class containing the vectors representing zones of the image comprising mainly vertical variations, and/or the class containing the vectors representing zones of the image comprising mainly diagonal variations, and/or the class containing the vectors representing zones of the image that are very highly textured and without any particular direction.

6. (currently amended) The method as claimed in claim 4 ~~or~~ 5, wherein the watermarking strength is also allocated (~~E406~~) according to the component of the image and the decomposition is a Haar wavelet decomposition.

7. (currently amended) The method as claimed in ~~any one of claim~~ ~~[[s]] 1 to 6~~, wherein, during the watermarking step, each component of the image is decomposed, according to another decomposition into sub-bands (~~E301~~), into sub-bands comprising coefficients, each coefficient being characterized by its position in the sub-band to which it belongs and its amplitude, and wherein the method also comprises a step (~~E313~~) of

reconstructing the image from the coefficients of the sub-bands and the coefficients whose amplitudes were modified.

8. (original) A method of detecting a signature inserted in an image comprising at least three components, comprising the steps of:

- decomposing at least one component of the image into detail sub-bands in various directions and comprising coefficients, each coefficient being characterized by its position in the detail sub-band to which it belongs and its amplitude,
- determining, for each position, information representing local amplitude variations in various directions from amplitudes of the coefficients at this position in the various detail sub-bands and coefficients close to this position in the various detail sub-bands,
- detecting the signature from at least some binary information inserted in a plurality of positions in the image and information representing local amplitude variations in various directions corresponding to the binary information.

9. (original) The method as claimed in claim 8, wherein the binary information used for the detection is the binary information included at positions on the image for which the information representing local amplitude variations in various directions corresponds to information representing predetermined local amplitude variations.

10. (original) The method as claimed in claim 8, wherein the weightings are allocated to at least some of the binary information, the weightings being allocated according to information representing amplitude variations at the positions corresponding to the positions of the binary information.

11. (original) A device for inserting a watermark composed of a plurality of binary information in an image comprising at least three components, the device comprising:

- means of decomposing at least one component of the image into detail sub-bands in various directions and comprising coefficients, each coefficient being characterized by its position in the detail sub-band to which it belongs and its amplitude.

- means of determining, for each position, information representing local amplitude variations in various directions from amplitudes of the coefficients at the position in the various detail sub-bands and coefficients close to the position in the various detail sub-bands,

- means of determining a watermarking strength at each position from information representing local amplitude variations in various directions determined for the position,

- means of forming, for each position and for each component, a vector whose coordinates are the amplitudes of the coefficients at the position in the various detail sub-bands of the component,

- means of selecting, for each position, one vector amongst the vectors formed for the position,

- means of watermarking the image by modifying, for each position, the amplitude of the coefficients which are the coordinates of the vector selected for the position according to the binary information corresponding to the position and according to the watermarking strength determined for the position.

12. (original) A device for detecting a signature inserted in an image comprising at least three components, the device comprising:

- means of decomposing at least one component of the image into detail sub-bands in various directions and comprising coefficients, each coefficient being characterized by its position in the detail sub-band to which it belongs and its amplitude,
- means of determining, for each position, information representing local amplitude variations in various directions from amplitudes of the coefficients at this position in the various detail sub-bands and coefficients close to this position in the various detail sub-bands,
- means of detecting the signature from at least some binary information inserted in a plurality of positions in the image and information representing local amplitude variations in various directions corresponding to the binary information.


13. (currently amended) A computer program stored on an information medium, said program containing instructions for implementing the watermarking method as claimed in ~~any one of claim[[s]] 1 to 7~~, when it is loaded into the executed by a computer system.

14. (currently amended) A computer program stored on an information medium, said program containing instructions for implementing the detection method as claimed in ~~any one of claim[[s]] 8 to 10~~, when it is loaded into and executed by a computer system.

15. (currently amended) An information medium comprising at least one image watermarked as claimed in ~~any one of claim[[s]] 1 to 7~~.

Respectfully submitted,

Dated: 5 May 06

By: 
Gerald E. Helget (Reg. No. 30,948)
BRIGGS AND MORGAN, P.A.
2200 IDS Center
80 South Eighth Street
Minneapolis, MN 55402
Telephone: (612) 977-8480